

CLAIMS

1. A method of purifying wastewater that comprises the steps of:
  - (i) passing the wastewater through an electrocoagulation cell which comprises a plurality of reaction plates or electrodes disposed within said cell and spaced apart from each other whereby said wastewater is treated by passing an electric current through the wastewater to thereby produce purified water;
  - (ii) re-using said purified water for cleaning or other purposes to produce wastewater; and
  - (iii) recycling the wastewater back to the electrocoagulation cell.
2. The method of claim 1 wherein the wastewater is filtered prior to step (i) to remove large particles, if present, from the wastewater.
3. The method of claim 2 wherein particles with a size greater than 200  $\mu\text{m}$  are removed.
4. The method of claim 1 and claim 2 wherein the wastewater is passed through one or a plurality of pre-treatment tanks to remove heavy oils, sludge and fuel, if present, from the wastewater.
5. The method of claim 1 wherein direct current is applied to the reaction plates or electrodes of the electrocoagulation cell.
6. The method of claim 1 wherein the electrocoagulation cell is orientated vertically so that an outlet conduit is located at the top of the electrocoagulation cell and an inlet conduit is located at the bottom of the electrocoagulation cell.
7. The method of claim 1 wherein the voltage applied to the electrodes falls within the range 10-110 volts.

8. The method of claim 7 wherein the voltage applied to the electrodes falls within the range 20-80 volts.
9. The method of claim 7 wherein the voltage applied to the electrodes falls within the range 20-60 volts.
- 5 10. The method of claim 1 wherein the current applied to the reaction plates or electrodes falls within the range 2-100 amps.
11. The method of claim 10 wherein the current applied to the reaction plates or electrodes falls within the range 5-60 amps.
12. The method of claim 10 wherein the current applied to the reaction plates or  
10 electrodes falls within the range 5-20 amps.
13. The method of claim 1 wherein the electrodes are manufactured from a metal selected from the group consisting of aluminium, steel, iron, titanium, silver and brass.
14. The method of claim 13 wherein the electrodes are manufactured from  
15 aluminium or titanium.
15. The method of claim 1 wherein 2-75 electrodes are used in the cell.
16. The method of claim 15 wherein 2-26 of the electrodes are connected to the power supply.
17. The method of claim 1 wherein the flow rate of wastewater through the  
20 electrocoagulation cell falls within the range 2-1000 L/min.
18. The method of claim 17 wherein the flow rate falls within the range 5-200 L/min.
19. The method of claim 17 wherein the flow rate falls within the range 10-50 L/min.

20. The method of claim 1 wherein the purified wastewater is discharged into one or a plurality settling tanks for separation of contaminated floc, if present, from the purified wastewater.
21. The method of claim 20 wherein the settling tanks are connected to a rainwater collection tank to allow collected rainwater to be discharged into the settling tanks to increase the volume of water available for recycling.
22. The method of claim 1 wherein the purified wastewater is filtered prior to re-use.
23. The method of claim 22 wherein particles with a size greater than 10  $\mu\text{m}$  are removed.
24. The method of claim 1 wherein the purified water is stored in a storage tank before re-use.
25. The method of claim 1 wherein the purified water is stored in a sump after re-use.
26. The method of claim 1 wherein after step (i) the wastewater is passed through a reverse osmosis system.
27. The method of claim 1 and claim 26 wherein the wastewater is passed through a de-chlorination system.
28. The method of any one of claims 1, 26 or 27 wherein the wastewater is passed through a water softening system.
29. The method of claim 1 wherein prior to step (i) the wastewater may be obtained from public or household showers, sinks, basins, baths, washing machines, dishwashers, kitchens or car washes and may be initially stored in a collection tank or sump.
30. A closed circuit system for processing wastewater that includes:

- (iv) a treatment zone comprising an electrochemical cell for processing wastewater so as to produce purified water;
- (v) an application zone for application or use of the purified water for cleaning or other operations which produce wastewater; and
- 5 (vi) a recycling zone for recycling the wastewater back to the electrocoagulation cell.

31. The system of claim 30 wherein the treatment zone includes one or a plurality of pre-treatment tanks for the removal of fuel, sludge and heavy oils, if present, from the wastewater.

10 32. The system of claim 30 and claim 31 wherein the treatment zone includes one or a plurality of settling or coagulation tanks.

33. The system of claim 32 wherein the treatment zone includes a collection tank for the collection of rainwater.

15 34. The system of any one of claims 30 to 33 wherein the treatment zone includes one or a plurality of filters.

35. The system of any one of claims 30 to 34 wherein the treatment zone includes a reverse osmosis system.

36. The system of any one of claims 30 to 35 wherein the treatment zone includes a water softening system.

20 37. The system of any one of claims 30 to 36 wherein the treatment zone includes a de-chlorination system.

38. The system of claim 30 wherein the application zone includes a storage tank or sump.

39. The system of claim 30 wherein the application zone is a cleaning zone and the

wastewater or grey water produced in said cleaning zone contains detergents and cleaning agents.

40. The system of claim 30 wherein the recycling zone includes a collection conduit for recycling the wastewater back to the electrocoagulation cell.

5 41. The system of claim 30 and claim 40 wherein the recycling zone includes a storage tank or sump.

42. The system of claim 30 wherein the system is automated.